

**STACKABLE AND INTERLOCKING CARRYING CASES FOR
A MOBILE TACTICAL COMMAND AND CONTROL CENTER**

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

This invention relates to stackable and interlocking carrying cases within which rack mounted electronics and a desk top are transported. The carrying cases can be stacked one above the other to facilitate shipment and storage or to build modular furniture (e.g., a desk) to conveniently fit within a tent at a mobile tactical command and control center located in the field.

[0002] 2. Background Art

It is desirable to transport fragile computers as well as related electrical hardware having communications, networking, data storage, and the like, applications in shock resistant portable cases so that such equipment can be transported without being subject to damage that it may otherwise be caused by shock and other mechanical forces to be encountered during transit. For example, the military may wish to ship listening equipment to a hostile environment to monitor and/or control a military exercise. By way of another example, a government agency may need sensitive equipment at a remote or inhospitable environment so that tests can be conducted and recorded.

[0003] Because of the relatively large size that characterize conventional shipping cases and the

equipment carried therein, it is often difficult to stack a number of such shipping cases close together on a pallet so as to fit within the cargo hold or storage space of a truck, plane or ship, particularly when storage space is at a premium. That is, a tall stack of conventional shipping containers is known to consume excessive cargo area as well as to be unstable so as to shift and possibly fall over during transit. Because of the large weight associated with the conventional shipping containers, it is often difficult to transport individual containers that must be hand carried onto an airplane or a helicopter or to a remote base over rugged terrain.

[0004] What is even more, a grouping of bulky shipping containers are undesirable at a command and control station in the field. More particularly, in some instances, access to and use of the equipment transported therewithin is not possible until some or all of the equipment is first removed from its container. Thus, a great deal of time may be wasted during loading and reloading the shipping containers which can lead to inefficiency, especially when it is desirable to create a highly mobile command and control center that is capable of rapid deployment. Once a shipping container has been emptied, it is typically pushed aside so as to consume valuable space within a small enclosure (e.g., a tent) in which the command and control personnel and their furnishings are based. Consequently, the shipping containers either create tight working conditions within a small enclosure or require that larger and more expensive enclosures be available within which to house the personnel and the equipment required to operate a remote command and control center.

SUMMARY OF THE INVENTION

[0005] Stackable and interlocking carrying cases are disclosed that are especially suitable for use

within a small enclosure (e.g., a tent) at a mobile tactical command and control center. The carrying cases are of relatively light weight, compact size and are preferably manufactured from a shock resistant material that is capable of minimizing the transfer of shock to the contents of the cases during transit.

[0006] A first of the stackable and interlocking carrying cases includes a pair of wheels at one end of the front and a pair of locking feet projecting from the opposite end of the front. The first carrying case also includes pairs of locking recesses at each end of the back. The pairs of wheels and locking feet at the front of one carrying case are received in interlocking engagement within respective pairs of locking recesses at the back of an adjacent carrying case so that a plurality of carrying cases can be stacked together in a vertical column having increased stability so as to be palletized for storage and shipment. The first carrying case has a pair of detachable side panel that are removed to permit access to conventional (e.g., 19 inch) rack mounted electronics that are supported by a shock isolated housing at the interior of the case. The shock isolated housing is retained at the interior of the carrying case by sets of shock deflecting coiled spring that are positioned between the housing and the case. Rack mounted electronics for communications, data storage, networking, and the like, applications are detachably connected to and supported by the shock isolated housing so as to be transported from place-to-place at the interior of the first carrying case.

[0007] A second one of the stackable and interlocking carrying cases has pairs of locking grooves formed at opposite ends of the front. A pair of locking feet project from one end of the back, and a pair of locking grooves are formed at the opposite end of the back. Thus, the first

and second stackable carrying cases may be interconnected in interlocking engagement with one another for building modular furniture that can be easily configured and broken down so as to be especially suitable for use within a small enclosure (e.g., a tent) for a mobile tactical command and control center in the field. To this end, the second carrying case has a hollow interior so as to receive a pull-out drawer and a pull-out desk top. Like the first carrying case, the second case has detachable side panels that are removed to permit the drawer to be pulled outwardly therefrom so as to enable access to the contents (e.g., stationary supplies) thereof. The desk top is pulled axially outward via an exit opening that is formed through the top of the case to establish a flat surface that is suitable for writing or for supporting a telephone, photograph, etc.

[0008] By arranging the first and second carrying cases in a pair of vertical stacks with the second carrying case located on top of one stack, the desk top can be pulled outwardly from the second case so as to extend between the vertical stacks and thereby create a modular desk. In addition, the drawer can also be pulled outwardly from the second case, whereby the modular desk may be used during a military or similar exercise with the convenience of a standard office desk. In this same regard, when the side panels are removed from selected ones of the first carrying cases in one or both of the stacks, access will be immediately available to the rack mounted electronics therewithin so as to provide the resources necessary to configure a space efficient tactical command and control center.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a prospective view of a first stackable and interlocking carrying case having particular application for a mobile tactical command and control center;

[0010] FIG. 2 is a front view of the first carrying case shown in FIG. 1;

[0011] FIG. 3 is a perspective view of the first carrying case with a side panel removed therefrom to permit access to a shock isolated housing at which rack mounted electronics are to be supported;

[0012] FIGs. 4 and 5 show a plurality of the first stackable and interlocking carrying cases arranged in interlocking engagement with one another for transport and storage;

[0013] FIG. 6 shows a side view of the first carrying case with a side panel removed and rack mounted electronics connected to and supported by the shock isolated housing at the interior of the case;

[0014] FIG. 7 is a perspective view of a second stackable and interlocking carrying case also having particular application for a mobile tactical command and control center;

[0015] FIGs. 8 and 9 are perspective views of the second carrying case shown in FIG. 7 having a pull-out drawer and a pull-out desk top; and

[0016] FIG. 10 show a plurality of the first and second carrying cases of FIGs. 1-9 stacked one above the other to build a modular desk of the type having particular application for a mobile tactical command and control center.

DETAILED DESCRIPTION

[0017] A first rugged, stackable and interlocking carrying case 1 which is adapted to carry conventional rack mounted electronics is initially described while referring to FIGs. 1-4 of the drawings. As will be described in greater detail hereinafter, the carrying case 1 is also especially adapted to function as a component to be configured as needed to build modular furniture for a mobile tactical command and control center to be assembled at a remote and/or hostile environment so as to enable military personnel, and the like, to have access to a variety of rack mounted electronics for the purpose of communications, networking, data storage, logistics, etc. That is, the stackable carrying case 1 can be interconnected with other interlocking carrying cases so as to form modular furniture (e.g., a desk) that can be quickly and easily assembled and broken down within the confines of a relatively small field command and control center, such as a tent, while providing for the efficient transport and storage of and access to the rack mounted electronics without requiring that the electronics first be removed from its carrying case.

[0018] Many of the external features of the stackable carrying case 1 that is shown in FIGs. 1-4 are similar to the features of the carrying case that has been shown and described in my prior U.S. Patent No. 6,585,090. Therefore, only a brief description of these features will be provided herein. The stackable carrying case 1 is preferably manufactured by means of a conventional vacuum forming process from a shock resistant material (e.g., ABS plastic) so as to be capable of safely transporting the rack mounted electronics within an airplane, helicopter, jeep, truck, etc. However, the particular rack mounted electronics (best shown in FIG. 6) to be transported within the carrying case 1 forms no part of this invention.

[0019] The body of carrying case 1 includes a top 3, bottom 5, front 7 and back 9. A pair of wheels 10 (best shown in FIG. 2) are rotatably coupled to the bottom 5, and a pair of locking feet 12 (best shown in FIG. 1) project from the top 3 of carrying case 1. First and second pairs of locking recesses 14 and 16 are molded into the back 9 at opposite ends of carrying case 1. As is best shown in FIGs. 4 and 5, the pair of wheels 10 and the pair of locking feet 12 from a first carrying case 1-1 are sized and positioned for receipt within respective ones of the first and second pairs of locking recesses 14 and 16 that are formed in an adjacent carrying case 1-2 located underneath the first carrying case 1-1. Thus, the first and adjacent carrying cases 1-1 and 1-2 are stacked together in interlocking engagement one above the other by which to prevent the first case 1-1 from shifting relative to the adjacent case 1-2 upon which the first case is seated. By virtue of the foregoing, a series of carrying cases may be efficiently stacked in one or more vertical columns for shipment on a single pallet (not shown) within the storage area of an airplane, boat or truck.

[0020] A pull-out handle 18 is recessed within a cavity 20 that is formed in the front 7 of carrying case 1 (best shown in FIG. 2). The pull-out handle 18 is slidable between retracted (in FIG. 1) and axially extended (in FIG. 2) positions to permit the carrying case 1 to be pulled and rolled from place-to-place. In the event that it is not desirable to use the pull-out handle 18 by which to pull the carrying case 1, a supplemental handle 22 is rotatably mounted and recessed within a pocket 24 at the top 3 of case 1 (best shown in FIG. 1). A complementary pocket 26 is located in the bottom 5 of carrying case 1 (best shown in FIG. 2) such that when a pair of carrying cases (designated 1-1 and 1-2 in FIG. 3) are located end-to-end, the respective first and complementary pockets 24 and 26 will be aligned in opposite facing alignment. Thus, a portion

of the rotatable supplemental handle 22 within the pocket 24 of a first carrying case within a horizontal row of carrying cases is received within the complementary pocket 26 of an adjacent carrying case within the same row, whereby the first and adjacent carrying cases will be arranged in interlocking end-to-end engagement with one another.

[0021] The close interlocking relationship of one stackable carrying case with additional carrying cases located adjacent the top, bottom, front and back thereof enables a plurality of carrying cases to be retained one above the other, side-by-side and end-to-end one another. Moreover, the aforementioned interlocking relationship of carrying cases facilitates the stacking of such carrying cases in a space efficient array of rows and columns like that shown at FIGs. 3 and 4, that is particularly suited for transport and/or storage.

[0022] Unlike the stackable carrying case of my Patent No. 6,585,090, access to the interior of the carrying case 1 of my current invention is gained through one or both of the opposite sides. More particularly, and referring concurrently to the FIGs. 1-6 of the drawings, the stackable carrying case 1 includes detachable side panels 28 and 30. As is best shown in FIGs. 1 and 2, the opposite side panels 28 and 30 are closed and locked for transport by means of a set of (e.g., four) conventional twist-off clasps 32 that are conveniently located at the interface of the side panels 28 and 30 with the front and back 7 and 9 of the carrying case 1. By applying a twisting force to rotatable actuating pieces of the twist-off clasps 32, slidable locking tabs 34 thereof are uncoupled from the associated side panels 28 and 30. At this time, the side panels 28 and 30 can be removed from the carrying case 1 (as shown in FIG. 5) to expose the rack mounted electronics which are retained at the interior of the case in a manner that will now be described.

[0023] Referring specifically to FIGs. 5 and 6 of the drawings, there is shown in FIG. 5, the stackable carrying case 1 with one of the side panels (e.g., 30) removed following the actuation of the corresponding twist-off clasps 32. In this case, the interior of the carrying case 1 is shown devoid of electronics so as to illustrate the rack assembly on which the electronics are mounted. The rack assembly includes a hollow rectangular shock isolated housing 35 having a pair of flat base plates 36 and 38 (best shown in FIG. 6) that are suspended above the front 7 and below the back 9 of the carrying case 1 by shock absorbing means. The shock isolated housing 35 also includes a pair of side walls 40 and 42 extending between base plates 36 and 38 and lying adjacent the top and bottom 3 and 5 of carrying case 1. The opposite ends of each of the side walls 40 and 42 of housing 35 bend inwardly towards one another to establish mounting rails 44 and 46 to which the electronics are attached. Access to the mounting rails 44 and 46 and to the electronics supported thereby (also best shown in FIG. 6) is available once one or both of the side panels 28 and 30 have been removed from the carrying case 1 to expose the shock isolated housing 35 at the interior thereof.

[0024] The shock absorbing means that enables the base plates 36 and 38 of shock isolated housing 35 to be suspended from the front and back 7 and 9 of carrying case 1 is generally similar to the shock absorbing means that is shown and described in my prior U.S. Patent No. 6,229,698. Therefore, only a brief description of this shock absorbing means will be provided herein. Such shock absorbing means includes upper and lower sets of metallic shock deflecting coiled springs 48 that are located at opposite sides of the carrying case 1 between the shock isolated housing 35 and the front and back 7 and 9 of carrying case 1.

[0025] Each spring 48 is supported by and threaded through a pair of spaced oppositely aligned mounting blocks 52 and 54. One mounting block 52 of each pair is attached to one of the base plates 36 or 38. The opposite mounting block 54 is attached to the front or back 7 or 9 of carrying case 1. The mounting block 52 and 54 have a series of holes formed therein to receive respective turns or loops of the springs 48. The mounting blocks 52 and 54 maintain the coiled springs 48 in a slightly compressed condition. As is best shown in FIG. 6, the turns of those springs 48 that are positioned adjacent the back 9 of carrying case 1 are thinner and spaced more closely together than the turns of the springs 48 that are positioned adjacent the front 7 of carrying case 1.

[0026] In the as-packaged condition of FIGs. 1 and 2 with the detachable side panels 28 and 30 attached to carrying case 1, the sets of shock deflecting springs 48 suspend the shock isolated housing 35 and the electronics supported thereby at the interior of the carrying case so as to prevent most of the impact forces to which the carrying case is subjected from being transferred to the electronics. That is, the sets of springs 48 allow the shock isolated housing 35 to float within carrying case 1 so that the electronics might avoid damage as a consequence of the impact forces that occur when the carrying case is transported from place-to-place. Likewise, the springs 48 stabilize sensitive electronics during use after one or both side panels 28 and 30 have been detached from the carrying case 1.

[0027] FIG. 6 shows the other side panel 28 removed from the carrying case 1 and the shock isolated housing 35 to which rack mounted electronics are connected. By way of example only, standard 19 inch rack mounted electronics are connected to the housing 35 to be transported

within the stackable carrying case 1. Such electronics may include a Kasten Chase Optiva server 56 (for secure communications interface), a Cisco router 57 (for communications interface), and a Cisco switch 58 (to implement a local area network). However, it is to be expressly understood that different electronics having a variety of different functions can be rack mounted in and transported by the carrying case 1 to maximize the versatility of a compact command and control center that is assembled in the field when a plurality of modular carrying cases are interconnected with one another. The rack mounted electronics 57-59 of FIG. 6 are detachably connected to the shock isolated housing 35 when mounting flanges 60-62 of the rack mounted electronics 57-59 are attached by suitable fasteners to the mounting rails (designated 44 and 46 in FIG. 5) at opposite side walls 42 and 44 of housing 35. Because of the open architecture offered by housing 35, different rack mounted electronics can be conveniently moved from case-to-case.

[0028] Turning now to FIGs. 7-9 of the drawings, a second rugged, stackable and interlocking carrying case 70 is shown and described. While the stackable carrying case 1 of FIGs. 1-6 is adapted to transport rack mounted electronics for data storage, communications and networking purposes, the carrying case 70 of FIGs. 7-9 is especially adapted to provide a work surface for a modular desk. That is to say, and as will be more fully described when referring to FIG. 10, a plurality of stackable carrying cases (including cases 1 and 70) can be quickly and easily configured to build a compact desk assembly which is ideally suited for use at a mobile tactical command and control center in the field.

[0029] The carrying case 70 includes first and second pairs of locking recesses 76 (best shown in

FIG. 7) formed at opposite ends of the front 78. Another pair of locking recesses 80 (best shown in FIG. 8) are formed at one end of the back 82 of carrying case 70. A pair of locking feet 84 (also best shown in FIG. 8) are formed at the opposite end of the back 82. The locking recesses 76 at the front 78 of carrying case 70 and the locking recesses and locking feet 80 and 84 at the back 82 are located so as to enable one or more of the stackable locking cases 70 to be mated in an interlocking relationship with other stackable carrying cases 1 in a vertical column to build the modular desk of FIG. 10.

[0030] Like the carrying case 1 of FIGs. 1-6, the carrying case 70 of FIGs. 7-9 has a rotatable handle 86 at the top 88 thereof to enable the carrying case 70 to be lifted and carried from place-to-place. Similarly, the carrying case 70 also has a pocket 90 formed at the bottom 92 to receive therewithin the handle 86 from an adjacent case.

[0031] However, instead of carrying rack mounted electronics, like the carrying case 1 of FIGs. 1-6, the carrying case 70 of FIGs. 7-9 includes a pull-out drawer 72 and a pull-out desk top 74. More particularly, rather than carrying the shock isolated housing (designated 35 in FIGs. 5 and 6) associated with carrying case 1 for supporting rack mounted electronics (designated 56-58 in FIG. 6), the interior of carrying case 70 is empty (i.e., hollow) so as to be capable of slidably receiving the pull-out drawer 72. The pull-out drawer 72 includes a handle 73 by which to enable field commanders and staff members to open the drawer once the side panels (designated 28 and 30 in FIGs. 1-4) have been removed from the opposite sides of carrying case 70. For purposes of convenience, an identical handle 73 can be located on each end of the drawer 72 so as to enable the drawer to be pulled outwardly from both sides of the carrying case 70 in the

manner illustrated by FIGs. 8 and 9. The drawer 72 of carrying case 70 is used in the same way as a drawer from a desk of the kind that is typically found in a home or office (e.g., to store stationary articles, and the like).

[0032] What is more, rather than having a cavity (designated 20 in FIG. 2) for receipt of a pull-out handle (designated 18) at the front 7 of the carrying case 1 by which to enable the carrying case to be pulled and rolled, the carrying case 70 is also capable of receiving the pull-out desk top 74 at the hollow interior thereof. The desk top 74 is accessible and slidable outwardly from the carrying case 70 at an exist opening 94 formed in the top 88 thereof. As is best shown in FIG. 8, the exit opening 94 communicates with the interior of carrying case 70 to enable the desk top 74 to be pulled outwardly to the axially extended position of FIG. 8 or pushed inwardly to the retracted position of FIG. 7 during transit. A blocking pin (not shown) extends transversely through one end of desk top 74 to prevent a separation of the desk top from its carrying case 70. When the pull-out desk top 74 is pushed inwardly via exit opening 94, the drawer 72 and the desk top 74 will sit one above the other at the interior of carrying case 70 between the front 78 and back 82.

[0033] In the axially extended position, the pull-out desk top 74 forms a convenient writing surface or a similar work surface for the modular desk assembly of FIG. 10. That is, desk top 74 provides a flat surface upon which notes may be written, telephones, computers and photographs may be placed, etc. To enable the work surface to be expanded, the pull-out desk top 74 is provided with a pair of fold-out desk flaps 96 and 98 (best shown in FIG. 9). The fold-out desk flaps 96 and 98 are pivotally connected to opposite sides of desk top 74 by means of well-known

spring loaded hinges 100. However, it should be recognized that other conventional hinges may also be used to connect flaps 76 and 98 to desk top 74.

[0034] When the desk top 74 is located at the interior of carrying case 70, the fold-out desk flaps 96 and 98 are rotated to a folded condition so as to sit side-by-side one another over top the desk top 74. In this case, the spring loaded hinges 100 will be stretched so as to store energy. When it is desirable to maximize the work surface of the desk with the desk top 74 pulled outwardly from case 70, one or both of the fold-out desk flaps 96 and 98 can be rotated to an unfolded condition so as to extend horizontally and outwardly from the desk top 74, whereby the energy stored by the corresponding spring loaded hinges 100 will be released.

[0035] As is best shown in FIG. 9, a pair of optional support braces 102 and 104 are carried at the bottom of the pull-out desk top 74. First ends of each support brace 102 and 104 are pivotally connected to a hinge plate 106 that is connected to the bottom of desk top 74. The opposite ends of the braces 102 and 104 are preferably beveled so as to form engagement surfaces with other carrying cases in the manner to be described when referring to FIG. 10 where the carrying case 70 is used as a module to create customized furniture. The support braces 102 and 104 are rotatable at hinge plate 106 from an at rest position lying flush against the bottom of desk top 74 when the desk top is to be located at the interior of the carrying case 70 to a deployed position shown in FIG. 10 when desk top 74 is pulled outwardly from the carrying case 70 to create customized furniture. A corresponding pair of catches 107 and 108 are affixed to the bottom of desk top 74 to retain the pair of support braces 102 and 104 in the at rest position. The support braces 102 and 104 may have a telescoping characteristic so as to provide an adjustable

length and thereby extend from the hinge plate 106 to the other carrying cases shown in FIG. 10.

[0036] FIG. 10 of the drawings shows stackable interlocking carrying cases configured to form customized modular furniture (e.g., a desk) 110 that can be quickly assembled within an enclosure, such as a tent (not shown) to support an efficient, mobile tactical command and control center in the field. The modules from which the desk 110 is built may include any number of the carrying case 1 of FIGs. 1-6, the carrying case 70 of FIGs. 7-9, and the carrying case that is shown and described in my aforementioned Patent No. 6,585,090. The desk 110 is assembled by first and second pluralities of the aforementioned interlocking carrying cases arranged in columns to build a pair of vertical stacks. The side panels (28 and 30) can be removed from selected ones of the carrying cases 1 in one or both of the stacks to gain access to the rack mounted electronics that are carried by housings 35 at the interior thereof on an as-needed basis depending upon the specific functions of the electronics.

[0037] The top-most case of at least one of the vertical stacks is preferably the carrying case 70 of FIGs. 7-9 having the pull-out drawer 72 and desk top 74. Thus, by pulling the desk top 74 outwardly from the carrying case 70 to the axially extended position as shown in FIG. 10, a flat work surface will be available that extends across the desk and between the vertical stacks. With the desk top 74 pulled to the axially extended position, the optional support brackets 102 and 104 are rotated downwardly to the deployed position at which the beveled edges thereof engage underlying carrying cases (e.g., 1) to provide the support necessary for office furnishings to rest safely upon the desk top 74. The user may also pull the drawer 72 outwardly from carrying case 70, whereby the modular desk 110 may be used during a military or similar exercise with the

convenience of a standard office desk.

[0038] By virtue of the foregoing, individual modular, stackable and interlocking carrying cases that transport standardized rack mounted electronics can be sized (e.g., 9 inches x 14 inches x 22 inches) so as to be treated as carry-on luggage on a commercial airliner. As shown in FIGs. 3 and 4, an array of the stackable carrying cases can be palletized for efficient storage and shipment by air, sea or land. As illustrated in FIG. 10, the ability to configure a plurality of the modular, stackable carrying cases into customized furniture enables very mobile tactical command and control centers to be deployed in the field without the weight and volume consumption that has typically characterized more traditional portable systems.

I CLAIM: